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The goal of the present study was to examine convergent and divergent validity among multiple informants (peers, teachers, child self-reports, observers, and parents) for childhood anxious solitude (solitary behavior due to social anxiety), unsociability (solitary behavior due to lack of interest in peers), and peer exclusion (being left out of peer activities). Participants were 688 children (334 male, 354 female) in third grade (*M* age at the outset of the study = 8.66 years, *SD* = .50). Naturalistic behavioral observations at recess and parent reports were available for a subset of the larger sample (*n* = 163, 67 male, 96 female). A multitrait-multimethod correlation matrix and structural equation modeling of this matrix were computed. As expected, peers demonstrated the best convergent validity. Results suggest that AS, unsociability, and peer exclusion highly correlate, which points to the importance of making clear definitions and distinctions when measuring constructs.

ANXIOUS SOLITUDE, UNSOCIABILITY, AND PEER EXCLUSION IN MIDDLE CHILDHOOD: A MULTITRAIT-MULTIMETHOD MATRIX

by

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APPROVAL PAGE

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CHAPTER I

INTRODUCTION

Because children's solitary behavior among familiar peers in middle childhood has multiple internal and external proximal sources, multi-method multi-informant research is needed to determine the most valid methods of identifying different reasons for solitude and distinguishing them from one another (as well as to infer these causes from children's behaviors, motivations, and affect). In addition, multi-method research is necessary in order to know how observable behaviors correspond to perceptions of social partners and children's underlying motivations.

It has commonly been assumed in past research that certain behaviors are indicative of three distinct reasons for solitude in middle childhood: anxious solitude (AS, solitary behavior due to social anxiety), unsociability (solitary behavior due to lack of interest in peers), and peer exclusion (being left out of peer activities). Yet linkages between self-reported motivations for solitude and specific observed solitary behaviors as well as social partners' perceptions of solitude have not been empirically investigated. This study aims to examine these relations.

Past Research of Agreement among Informants

Research on agreement among informants of childhood solitude has often focused on agreement among social partners only (teachers, peers, and/or parents). Past research indicates that there is greater teacher-peer than teacher-parent convergence because peers and teachers have a shared environment in middle childhood (Achenbach, McConaughy, & Howell, 1987; Ledingham, Younger, Swartzman, & Bergeron, 1982), but self reports and behavioral observations of solitude have been examined less often. Past research has also found greater teacher-peer than self-peer or self-teacher convergence (Achenbach, McConaughy, & Howell; Gazelle & Ladd, 2003; Ledingham et al., 1982). Self-report and observational information is important because self-reports provide the only direct measure of the child's subjective experience of affect and motivation and observations provide the most objective report of the form and frequency of solitary behaviors. Therefore these forms of assessment allow assumptions about the motivational underpinnings and outward manifestations of specific solitary behaviors to be tested empirically.

Achenbach, McConaughy, and Howell (1987) suggest that peers and teachers demonstrate greater convergence on child behaviors because of shared environment: both observe children interacting with familiar peers in the same school setting. In contrast, parents do not usually see their children in the context of school and there is some evidence to suggest that they make judgments about their children's behavior based on their children's interactions with family members (i.e., siblings) and adult strangers rather

than with familiar peers at school (Stevenson-Hinde & Glover, 1996). Children are likely to behave differently with peers than with these other social partners because they have more choice about engaging in interaction and may encounter different social consequences for their behaviors (e.g., teasing and peer rejection).

It is important to examine agreement among informants not only for these conceptual reasons but also because of empirical evidence indicating that peer ratings provide the highest estimates of deviant behavior and self-ratings yield the lowest (Ledingham et al., 1982); however, behavioral observations have not been considered in these comparisons. Self-ratings are generally lower than teacher or peer ratings on aggression and withdrawal and higher on perceived acceptance. Children may not rate themselves accurately with peers and teachers because they may not be highly aware of how their social behaviors compare to those of peers. This possibility may occur for solitary children in particular because they have less social contact with peers by definition and thus may not have a normative frame of reference. Also, children in general, like adults, may rate themselves higher on positive characteristics and lower on negative characteristics because they commit the fundamental attribution error (Pronin, Lin, & Ross, 2002). This error occurs when people explain their own behaviors through situational demands but attribute the behaviors of others to internal characteristics or traits. Therefore, children may take situational factors into consideration when reporting their own solitary and social behavior (e.g., "I play alone at recess because the games the other kids play are boring"). Despite these shortcomings, self-reports are the only direct

source of information on motivation against which to compare the inferences about motivation for solitude made by social partners.

The current study is novel for two reasons: because it examines multiple informant convergence for unsociability and because it includes recess observations of free play. To our knowledge, past studies have investigated multiple-informant convergence for AS and peer exclusion, but not for unsociability, so this study is novel in that it includes multiple informant convergence for unsociability as well. This study is also novel in that it includes recess observations from trained observers, and to our knowledge, previous investigations have not included recess observations in analyses of agreement among informants of solitude to date. For example, past research has suggested that unsociable behavior often occurs because these children have an object orientation rather than a person orientation. Including observational data will reveal whether children who report unsociable motivation for solitude engage in directed play or if they are actually unoccupied when in the company of peers. Additionally, this study will extend previous research based on peer sociometrics and teacher reports that has provided evidence that children who display AS are often excluded by their peers by examining whether similar patterns are evident in recess observations.

Types of Solitude

A review of relevant literature (e.g., Asendorpf, 1990; Coplan, Gavinsky-Molina, Lagace-Seguin, & Wichmann, 2001; Coplan, Rubin, Fox, Calkins, & Stewart, 1994; Harrist, Zaia, Bates, Dodge, & Pettit, 1997; Rubin & Asendorpf, 1993; Rubin & Mills,

1988; Younger, Schneider, Wadeson, Guirguis, & Bergeron, 2000) suggests that there are three reasons children may frequently play alone. Children who frequently play alone among familiar peers may be anxious solitary (AS, often called anxious withdrawal or conflicted shyness), unsociable (disinterested in peers), or excluded by peers (sometimes labeled active isolation). Although some authors have suggested that these reasons for solitude are mutually exclusive (see Rubin & Asendorpf, 1993), recent research indicates that there is significant co-occurrence among these three, particularly between AS and peer exclusion. Although the overlap between AS and peer exclusion has been overlooked in past research, AS behaviors appear to contribute to risk for peer mistreatment because they signal vulnerability, as well as inspire peer dislike (Gazelle & Ladd, 2003). Also, Coplan, Prakash, O'Neil, and Armer (2004) provide evidence for moderate correlations between maternally-reported AS and unsociability that has often been overlooked in research on children as informant error. Although past studies have suggested that unsociability is often not met with peer rejection, particularly in the early years (Coplan et al., 1994; Rubin, Coplan, Fox, & Calkins, 1995), little research has focused on the relation between unsociability and peer exclusion. In early childhood, research has linked unsociability (as measured through observational and parent reports) with normative information processing and emotion regulation with little evidence for maladjustment or peer rejection (Coplan et al., 2001; Coplan et al., 1994; Coplan & Rubin, 1998; Harrist et al., 1997; Rubin, Coplan, Fox, & Calkins, 1995). Although these findings suggest that unsociability in early childhood is adaptive, this may not apply to

middle and later childhood when this behavior is seen by peers as a deviation from social norms (Coplan & Rubin, 1998; Coplan et al., 2001).

Components of Solitude

The impetus for AS and unsociability are conceptualized as internal, whereas the impetus for peer exclusion is conceptualized as external because it is imposed on the child by peers. Internally-based forms of solitude can be conceptualized as motivational/affective-behavioral constructs. That is they can be conceptualized through (1) motivation (why the child plays alone), (2) affect (emotions the child displays when playing alone), and (3) behavior (the form of solitary behavior the child demonstrates). To further define and distinguish between each type of solitude in the company of peers, each term is discussed in turn.

Anxious solitude. Children are typically identified as AS when they display shy, verbally inhibited, and reticent behavior (onlooking and unoccupied solitary behavior) among familiar peers (Coplan, 2000; Coplan & Rubin, 1998). These behaviors are thought to be manifestations of a conflict between normative social approach motivation and high social avoidance motivation (Asendorpf, 1991; Coplan et al., 1994; Stewart & Rubin, 1995). This motivational conflict occurs when children want to interact with their peers but paradoxically avoid them due to fear of poor social performance and negative peer treatment. This prompts children to place themselves in the proximity of peers but then make no attempt to join into their activity. This onlooking behavior is considered to be hallmark of social anxiety and social evaluative concerns. Social partners may infer

that children who display such behavior are shy and afraid. In other research, "conflicted shyness" and "anxious withdrawal" are used to identify similar characteristics. These terms are synonymous with AS, although the term AS is preferred because it is behaviorally concrete and descriptive.

Unsociability. In past research, solitary passive or directed behavior (e.g., quiet, directed, exploratory, and constructive behavior such as drawing pictures or reading while playing alone, Coplan et al., 2001; Rubin, 1982) has been assumed to be indicative of social disinterest or unsociability (Coplan, et al., 2004). Unsociability is defined as solitary behavior motivated by low-approach and normative avoidance motivation (Rubin & Asendorpf, 1993). In other words, unsociable behavior is motivated by lack of desire to play with peers but not fear or actively avoid peers. Social partners may infer that these children are disinterested in peers and content to play alone.

It has been suggested that unsociability may reflect an object orientation rather than a person orientation (Jennings, 1975). However, the relation between this objected-oriented behavior and self-reported social disinterest has not been reported to date. Likewise, the connection between directed or solitary passive behavior and unsociable motivation has not been empirically tested. The present study allows for empirical examination of links between specific forms of solitary behavior and self-reported social disinterest. If an object orientation is the cause of unsociability, self-reported unsociability would be expected to correspond to directed solitary activities at recess, such as swinging or engaging in dramatic play with playground equipment.

Peer exclusion. Peer exclusion cannot be described in terms of behavior, motivation, and affect like the two other types of solitude because it is imposed on the child from the outside world. Peer exclusion is characterized by being left out of peers' activities, which can occur through direct ("you can't play") or indirect actions (not choosing child for team, ignoring child's attempt to join into a group) (Gazelle & Ladd, 2003). Exclusion is defined by the peer actor rather than the target child, although past research has often defined peer exclusion in terms of the target child's behavior (i.e., solitary-active behavior: repetitive functional or dramatic solitary behavior) (Rubin and Asendorpf, 1993).

Gender Differences

Anxious solitude appears to be equally prevalent among girls and boys (Coplan et al., 1994; Coplan et al., 2001; Coplan & Rubin, 1998; Rubin, 1982); however, related constructs (including anxiety disorders such as social phobia) are more prevalent in females throughout the lifespan (Albano & Krain, 2005; Beidel & Turner, 1998; Kearney, 2004; Rapee & Sweeney, 2001). In addition, previous studies have indicated that AS boys tend to experience greater peer adversity than their female counterparts (Caspi, Elder, & Bem, 1988; Coplan et al., 2001; Gazelle & Ladd, 2003; Morison & Masten, 1991; Rubin, Chen, & Hymel, 1993; Stevenson-Hinde & Glover, 1996**).** The tendency in research to emphasize this gender difference may have discounted girls' risks for relational difficulties. Recent studies suggest AS girls are also excluded and mistreated by their peers; however, the degree of this mistreatment may differ between

boys and girls (Gazelle, Putallaz, Li, Grimes, Kupersmidt, & Coie, 2005; Gazelle & Rudolph, 2004).

Analytic Plan

Results for the current study were examined using both the traditional methods presented by Campbell and Fiske (1959) for a multitrait-multimethod correlation matrix (MTMM matrix), as well as the more recent structural equation modeling methods (SEM; Kline, 2005). SEM allows for more advanced examination of construct validity and is therefore considered the primary approach for examining MTMM data in this investigation. For simplification, the remainder of the text will refer to "traits" as "constructs" and "methods" as "informants" when discussing MTMM analyses.

Using the traditional MTMM method, convergent and divergent validity were examined by comparing correlations of constructs measured by multiple informants conducting tests of significance among correlated correlations using MULTICORR (Steiger, 1979). Convergent validity refers to the idea that concepts that are conceptually related and independently measured should correlate highly. Specifically, for the same construct, measures by different informants should correlate highly with each other. Divergent validity refers to the idea that concepts that should not be conceptually related should not correlate highly. Specifically, divergent validity is indicative of informants' ability to distinguish among constructs. Campbell and Fiske (1959) outline three methods for assessing divergent validity. First, measures by different informants should correlate higher with each other for the same construct than they do with measures of

different constructs. Second, in order to examine shared method variance, Campbell and Fiske suggest that correlations between the same construct by different informants should be greater than correlations between different constructs measured by the same informants. Finally, the same pattern of intercorrelations should result in the different construct – same informant triangles and in the different construct – different informant triangles. If these three criteria are satisfied, underlying constructs are thought to be truly correlated, however, failure to meet these criteria implies the correlations are due to method bias.

In SEM, convergent and divergent validity were assessed by means of a confirmatory factor analyses (CFA). Although it is common to use the correlated trait – correlated method (CTCM) approach to analyze MTMM matrices to directly examine convergent and divergent validity, the CTCM model did not converge in the current study. Instead, the correlated trait – correlated uniqueness (CTCU) model was used to represent these data, which allows the error terms of each informant to correlate across constructs rather than having separate trait factors and method factors as the CTCM model does (see Figure 1 for differences between CTCM and CTCU models; Kline, 2005). Convergent validity was measured by examining each informant's weight to the latent constructs. Divergent validity is assessed by examining the correlations among latent constructs, with large correlations being indicative of poor divergent validity. Divergent validity is also examined by allowing the error terms of each informant to correlate across constructs. Large correlations among error terms are indicative of high

shared method variance. Using SEM, gender differences were examined by conducting several test of measurement invariance for multi-sample groups to determine if the covariance matrices for girls and boys were equivalent.

Hypotheses

Consistent with previous findings, it was expected that for AS, unsociability, and exclusion among peer-teacher convergence would be larger than self-peer or self-teacher agreement because of a shared context. It was expected that observers would have comparable agreement with peers and teachers because they shared the context of the school recess environment. Convergence among parents and all other informants was expected to be poor because parents often lack the opportunity to directly observe their children in the school environment. Similarly, self reports were expected to have poor agreement with other informants because of self-report biases. Self reports may be inaccurate because of solitary children's lack of awareness of normative social behavior or the fundamental attribution error.

In addition to examining convergent validity, divergent validity is an important quality of valid measurement. No specific patterns were expected in terms of divergent validity; however, self-reports were expected to have reasonable divergent validity because they are the only direct source of the motivation for solitude. Social partners and observers may have difficulty distinguishing among each form of solitude, but children are expected to be able to accurately report their own motivations for solitude.

Considerable correlations were expected among these constructs, particularly between AS and peer exclusion because this link has been demonstrated in past research (Gazelle & Ladd, 2003). These constructs are not considered mutually exclusive and it is possible that children exhibit more than one of these constructs within a short time period. For example, exclusion could occur simultaneously with AS and unsociability.

Few gender differences were expected because each source of solitude was expected to be displayed through similar affect and behavior by both boys and girls. It was expected that AS-exclusion correlations would be large for both boys and girls; however, this correlation was expected to be slightly larger for boys.

The current study also permits a test of whether unoccupied and onlooking solitary behavior (both typically considered to be components of reticent behavior) are differentially related to AS as assessed by reports from self and social partners. Similarly, the idea that unsociability reflects an object orientation rather than a person orientation will be tested by examining the correlation between directed solitary behavior and self reported unsociability. If children have competing object and person orientations, they should be engaged in directed behaviors while alone in the company of peers. However, if unsociable children are unoccupied in the company of peers, they may not have interest in peers or objects.

Finally, because peer exclusion has been measured primarily in past research through teacher report and peer sociometrics, little is known about how it will correspond

to recess observations. It was expected that peer- and teacher-reported exclusion would correspond to a composite of observed direct and indirect exclusion.

CHAPTER II

METHOD

Participants

Several measures were available for a large sample whereas additional measures were available only for a selected subset of the larger sample. Each sample is discussed in turn.

Large sample. Participants were 688 children with informed parental consent (*M* age at the outset of the study = 8.66 years, *SD* = .50) drawn from all 46 3rd grade classrooms in seven public elementary schools. This sample represents 80% (688 out of 856) of children in these 46 classrooms. Girls and boys were approximately equally represented (51.5% female (*n* = 354), 48.5% male (*n* = 334)), and the sample was diverse in regard to race/ethnicity (61.8% European American, 20.3% African American, 16.1% Latino, and 1.7% Asian American). The sample was also diverse in regard to socioeconomic status, with 29.8% of students receiving free or reduced lunch. Third grade children were selected because the current study focuses on self-reported motivation for solitude and children at this age are expected to have an emerging ability to take on a self-reflective role (Shaffer, 2005). In addition, this grade-level corresponds to the first age at which there is evidence that peer sociometrics are reliable assessments of AS (Younger, Schwartzman, & Ledingham, 1985, 1986).

Selected sample. One-hundred sixty-three children were selected from the larger sample for observational and parent assessments. Approximately half of these participants (n = 80) were selected because they scored at or above 1 *SD* on the peer-reported AS composite. Approximately an equal number of children were selected as demographically matched controls (n = 83) in order to eliminate demographics as a confound for any observed differences among AS and non-AS children. Controls were selected on the basis of being the closest match for AS children in regard to sex, ethnicity, age, classroom, and free- or reduced-lunch status. Selected children did not differ from non-selected children in the large sample in regard to age (selected M = 8.70 years, SD = .55, non-selected M = 8.65 years, SD = .48, t = .94, *ns*) or in the rate at which they received free or reduced lunch (selected 31%, non-selected 29%, χ^2 (1, N = 205) = 0.23, *ns*). There was a higher frequency of female (59%) than male (41%) selected children, in comparison to non-selected children (female 49%, male 51%, χ^2 (1, N = 688) = 4.74, $p < .05$). The race/ethnicity of the selected sample is diverse and resembles the composition of the large sample except that marginally more Latino (χ^2 (1, N = 688) = 3.53, $p < .10$) and significantly fewer African American children (χ^2 (1, N = 688) = 6.19, $p < .05$) were selected (selected vs. non-selected: 64% vs. 61% European American, 14% vs. 23% African American, 21% vs. 15% Latino, and 2% vs. 2% Asian American). Because children were selected on the basis of elevated AS scores (or having demographics that matched those of children with elevated AS scores), demographic

discrepancies between the large and selected samples are a result of differential prevalence of elevated AS among demographic groups in this sample.

Measures

AS, unsociability, and exclusion were each assessed by five informants: peers, self, teachers, parents, and trained observers. Each of these is described in turn.

Peer reports. Sociometric interviews were administered simultaneously to all participating children in each classroom in the Fall semester (at least two months after the beginning of the school year so children had time to get to know one another). The percentage of participating children in each class ranged from 70 to 100 % (M = 81 %). In addition to informed affirmative parental consent, children indicated their own assent. Each child was given a card with the word "yes" on one side and the word "no" on the other. They assented by turning their card to "yes" or declined to participate by turning their card to "no." Children without parental consent and any children who did not give affirmative assent were moved to a separate area of the classroom and were either given puzzles or class work. Each nomination was read aloud to the class by trained research assistant and then children selected classmates' names on their individual class rosters. Nominations were unlimited and cross-sex nominations were allowed because these procedures result in superior psychometric properties (Foster, Bell-Dolan, & Berler, 1986; Terry & Coie, 1991). Self-nominations were allowed; however, peer-and self-report composites were computed separately. Children's scores on each item were equal

to the total number of nominations they received from classmates. These scores were standardized by classroom to control for variation in classroom size.

An AS composite was comprised by averaging three items, with higher scores indicating higher levels of AS ($\alpha = .81$): (1) "Some kids act really shy around other kids. They seem to be nervous or afraid to be around other kids and they don't talk much. They often play alone at recess. Who are the kids in your class who are shy and play alone a lot?;" (2) "Some kids watch what other kids are doing but don't join in. At recess they watch other kids play but they play by themselves. Who are the kids in your class who are shy and watch other kids but play alone a lot?;" and (3) "Some kids are very quiet. They don't have much to say to other kids. Who in your class is shy and doesn't have much to say to other kids?"

A single item was used to identify unsociable behavior: "Some kids play alone a lot <u>not</u> because they're shy or afraid, but because they <u>like</u> to play alone. Because these kids like to do things alone, they often <u>don't try</u> to play with other kids. Who are the kids in your class who <u>like</u> to play alone but aren't shy?"

An exclusion composite was formed by averaging two items identifying direct exclusion and indirect exclusion with higher scores indicating higher levels of exclusion ($\alpha = .79$): direct exclusion (1) "When some kids ask if they can play, other kids say 'no' and won't let them play. Who are the kids in your class who can't play?" and indirect exclusion (2) "Some kids get left out when other kids are talking and playing together.

They don’t get invited to parties or chosen to be on teams or to be work partners. Who are the kids in your class who get left out and aren’t chosen?"

Self reports. Children completed self-nominations during the sociometric interview that were identical to peer nominations in content and scoring, except they were not standardized by class size.

Teacher reports. Teachers rated how strongly each child's behavior resembled specific behavioral profiles on a 5-point scale (0 for no resemblance to 4 for perfect resemblance) in the Fall semester. The AS profile was "children who, when with peers, act shy, don't talk much, and seem to be nervous or self-conscious. They often play alone at recess and may sit alone at lunch or not have anyone to talk to at lunch." The unsociable profile was "children who often play alone not because they're shy or afraid, but because they like to play alone. Because these children like to do things alone, they often don't try to play with other children." The exclusion profile was "children who get left out when other children are talking or playing together. They don't get invited to parties or chosen to be on teams or to be work partners."

Parent reports. Parents of selected children completed an adapted version of the Child Behavior Scale (CBS). Ratings assessed how strongly their child's behavior resembled specific behavioral profiles on a 3-point scale (0 for doesn't apply to 2 for certainly applies) (Ladd & Profilet, 1996). Questionnaires were sent home with children at school at the end of the Fall semester and returned at school or through the mail in the Spring semester. Composites were formed by averaging items from the CBS to reflect

AS (five items including: shy with peers, watches or listens to peers without joining in; (α = .61), unsociability (four items including: not interested in peers, enjoys solitary activity while peers socialize; (α = .65), and exclusion (five items including: not chosen as playmate by peers, excluded from peers' activities; (α = .82). Higher scores on each composite were indicative of higher levels of AS, unsociability, or exclusion.

Recess observations. In addition to the peer, teacher, self, and parent reports, selected children (*n* = 163) were observed in the Fall and Spring during naturalistic free play at school recess for five 5-minute intervals (on at least 3 separate days) for a total of 25 minutes of observed free play activity per child. The occurrence of mutually-exclusive child behaviors and peer responses were coded live in 30-s observe, 30-s record intervals. Scores reported indicate the proportion of intervals that a behavior or peer response occurred (# of intervals code observed / total # observational intervals). The Peer Interaction Observational System (PIOS) was created for the present study. The PIOS was adapted from two existing observational systems: the Play Observation System (POS, Rubin, 2001) and a system developed by Putallaz and Wasserman (1989). Two trained research assistants double-coded 23.7% of the observations. Inter-rater reliability (i.e. Cohen's kappas, κ) was acceptable for all variables and is reported by construct below.

Codes relevant to the present analyses were the child codes "alone-directed," "alone-unoccupied," "alone-onlooker" and the group responses "excluded" and "ignore." "Alone-directed" was recorded when a child was engaged in a solitary activity, such as

swinging or playing on the slide ($\kappa = .87$). "Alone-unoccupied" was recorded when a child was alone but not engaged in any activity, such as wandering aimlessly or staring into space ($\kappa = .86$). "Alone-onlooker" was recorded when a child was within 10 feet of a peer group and visually attending to the group, but made no attempt to join ($\kappa = .90$). Group responses were coded as "excluded" when peers directly told the target child he/she couldn't play or ran away from him/her and "ignore" when peers indirectly did not include the target child in their group activity or otherwise acknowledge the target child's presence but there were no additional indications of either rejection or acceptance ($\kappa =$ .80 and .96 respectively). An exclusion composite was formed by summing "excluded" and "ignore."

CHAPTER III

RESULTS

Overview

As previously mentioned, results for the current study were examined using both the traditional MTMM methods presented by Campbell and Fiske (1959) as well as the more recent SEM methods (SEM; Kline, 2005). Using SEM, confirmatory factor analysis (CFA) models were computed using the AMOS 6.0 statistical package (Arbuckle, 2005). These CFAs were constructed according to guidelines for a correlated trait – correlated uniqueness (CTCU) model in which shared-method variance is estimated by allowing error terms for each informant to correlate across constructs (Kline, 2005). Additionally, because it is common when testing structural models, alternative models were computed for comparison.

Traditional MTMM Analysis

A correlation matrix was computed to establish convergent and divergent validity of anxious solitude, unsociability, and peer exclusion as assessed by five informants (see Table 1). Although it was originally expected that observed directed solitary play would indicate unsociability (Coplan et al., 1994), significant correlations emerged among self-reported unsociability and observed unoccupied solitary behavior ($r = .25$, $p < .001$), rather than directed solitary behavior ($r = -.06$, $p = .46$). Self-reported unsociability was

given particular importance because it is the only direct source of motivations for solitude. Therefore, unoccupied solitary behavior (rather than directed solitary behavior) was employed as the observed index of unsociability (see Table 1). To avoid collinearity, unoccupied solitary behavior was not combined with onlooking solitary behavior to form a reticence composite to assess AS behavior. Therefore, solitary onlooking behavior was employed as the only observed index of AS behavior.

Convergent validity. In order to assess convergent validity, independent measures of the same construct should correlate strongly (Campbell & Fiske, 1959; see validity diagonals in Table 1). Comparisons of correlations for AS, unsociability, and peer exclusion indicated that convergent validity was larger for AS and exclusion than for unsociability (average *r*s = .26, .30 vs. .13 respectively; see Table 2). The largest convergent validity correlations were for exclusion, with correlations ranging from .20 to .43, in comparison to.15 to .39 for AS and -.02 to .25 for unsociability. All average correlations were significantly different from zero at $p < .05$ or better.

For AS, the informants with the greatest convergent validity were peers and teachers ($r = .39$, $p < .001$), teachers and observers ($r = .35$, $p < .001$), and peers and parents ($r = .32$, $p < .01$). For unsociability, the informants with the greatest convergent validity were peers and teachers ($r = .25$, $p < .001$), self and observers ($r = .25$, $p < .001$), and teachers and observers ($r = .18$, $p < .05$). For exclusion, the informants with the greatest convergent validity were self and parents ($r = .43$, $p < .001$), peers and teachers ($r = .42$, $p < .001$), and peers and parents ($r = .38$, $p < .001$). The large convergence

among peers-teachers and teachers-observers was consistent with expectations, whereas the large convergence among self and parents with other informants was not.

Divergent validity. Campbell and Fiske (1959) outline three methods for assessing divergent validity. First, divergent validity was computed by comparing all correlations among different informants for the same construct versus those for different informants rating different constructs. Correlations of different informants for the same versus different constructs should be more strongly correlated (Campbell & Fiske, 1959). In Table 1, values in the same construct – different informant validity diagonals were compared to values in the different construct – different informant triangles that were in the same row and column within the surrounding different construct – different informant and different construct – same informant triangles (see Campbell & Fiske for details). Correlations were compared using the MULTICORR program (Steiger, 1979, 1980a, 1980b) designed to test for statistical differences among correlated correlations. In Table 2, the column labeled "Percentage CV > DCDI" displays the percentage of appropriate validity diagonal correlations that are statistically greater than correlations in the surrounding different construct – different informant triangles at $p < .05$ or better. Results for AS, unsociability, and peer exclusion indicated that divergent validity was supported more for AS and exclusion than for unsociability (with an average of 28% and 38% of validity diagonal correlations exceeding the different construct-different informant correlations for AS and exclusion respectively vs. 13% for unsociability; see Table 2).

For AS, the peer-teacher correlation had acceptable divergent validity in terms of the first criterion outlined by Campbell and Fiske, meaning validity diagonal correlations were greater than correlations of different constructs rated by different informants (see Table 2). For unsociability, divergent validity was rather poor for each set of informants. For exclusion, divergent validity was comparable to AS with acceptable divergent validity according to the first criterion outlined by Campbell and Fiske for peer-teacher (and self-parent) correlations.

Second, in order to examine shared method variance, Campbell and Fiske (1959) suggest that correlations of the same construct by different informants should be greater than measures of different constructs measured by the same informants. In Table 2, the column labeled "Percentage CV > DCSI" displays the percentage of appropriate validity diagonal correlations that are statistically greater than correlations in the surrounding different construct – same informant triangles at $p < .05$ or better. The majority of the validity diagonal values were not greater than those in the different construct – same informant triangles (see Table 2); suggesting poor divergent validity and/or substantial shared method variance among constructs. Considerable shared method variance of AS, unsociability, and peer exclusion was observed (in Table 1, see values in triangles with dashed lines: different construct – same informant correlations).

Finally, in order to examine divergent validity, Campbell and Fiske (1959) suggest the same pattern of intercorrelations should result in the different construct – same informant triangles and in the different construct – different informant triangles. By

comparing the patterns in each of these triangles (see Table 1), the same patterns did not appear to emerge in the different construct – different informant triangles; however, an interesting pattern emerged in the different construct – same informant triangles. Specifically, all these triangles had similar patterns except for the one displaying correlations among observers. The correlation (r = .16) between onlooking solitary behavior and unoccupied solitary behavior was much lower than correlations in the same position in other different construct – same informant triangles (and much lower than all the correlations in these triangles in general).

Structural Equation Modeling

The models. To examine convergent and divergent validity, CFAs were conducted (depicted in Figures 2, 3, and 4). In each of these models, the large circles represent the three underlying latent constructs or factors: AS, unsociability, and peer exclusion. The boxes represent the measured variables for each construct by informant: peers, observers, parents, teachers, and self. The single-headed arrows from the large circles to the boxes represent the factor loadings of the observed variables onto their respective latent constructs. The curved arrows between the large circles represent the correlations between the latent constructs. The smaller circles represent the error terms, or unexplained variance, associated with each observed variable. Error terms were allowed to correlate within informant across constructs to represent shared method variance. Although not depicted in the figures, each of the latent constructs and error

terms were constrained to have a variance of 1.0, and all paths not depicted in figures were constrained to be equal to zero.

Fit Indices. Several indices were used to evaluate model fit, including the chi-square, normed chi-square (NC) statistic, root mean square residual error of approximation (RMSEA), the standardized root mean squared residual (SRMR), the goodness-of-fit index (GFI), and the comparative fit index (CFI) (Hu & Bentler, 1999). The chi-square is a statistical test of "badness of fit," with significant values indicating that the model does not fit the data. However, the chi-square statistic is sensitive to sample size, so significant values are often a product of large sample size rather than poor model fit. The normed chi-square (NC) statistic corrects for this sensitivity by dividing the chi square by the degrees of freedom for the model. The RMSEA is another "badness of fit" index; however, it corrects for model complexity. Hu and Bentler suggest that RMSEA values that are less than or equal to .06 are considered to be acceptable. The SRMR is the standardized average of the covariance residuals, or more specifically the difference between the observed covariances and the predicted covariances. SRMR values of .08 or lower are indicative of acceptable fit. The GFI is essentially a coefficient of determination that is conceptually similar to R^2 values, with values exceeding .95 indicating good fit. The CFI is an index that compares the specified model to a model in which all variables are assumed to be uncorrelated (i.e., the null model). The CFI ranges from 0 to 1, with values exceeding .95 generally considered to be indicative of adequate fit.

To compare model fit for the current study's three-factor model, as well as competing one-factor and two-factor models several additional predictive fit indices were used, including the expected cross-validation index (ECVI), the Akaike information criterion (AIC), and the Bayesian information criterion (BIC) (Kline, 2005). Lower values of each of these indicate better model fit. The ECVI is a predictive fix index used to rank order competing models. The AIC is also a predictive fit index which is generally used in SEM to select among competing models estimated with the same data; however, AIC is parsimony-adjusted and favors simpler models. The BIC is also a predictive fit index that takes into account sample size but is also strongly affected by model complexity. Fit indices for the hypothesized three-factor, as well as competing two-factor and one-factor models are displayed in Table 3.

Convergent validity. Convergent validity was evident in the size and significance of the standardized factor loadings of the observed variables on their respective constructs or latent factors, after controlling for shared method variance and the contributions of other informants on the same latent construct. In the current study, every measured informant loaded significantly onto its respective latent construct, revealing significant levels of convergent validity ($ps < .002$). Unexpectedly, factor loadings were not significantly different for the two- and one-factor models. All factor loadings in the SEM model were compared statistically by using a *t*-test computed by dividing the difference of two standardized factor loadings by their pooled standard error. For each of the three models, factor loadings were largest for peers ($\lambda s = .50 - .82$), followed by

observers (λs = .40 - .60), parents (λs = .37 - .47), then teachers (λs = .32 - .44), and self (λs = .12 - .30). When examining the three-factor model, peers had significantly higher convergent validity for AS than any of the other informants (λ = .82, see Table 4 for factor loadings and significance levels); however, for unsociability and peer exclusion, peers and observers had the highest convergent validity and were not significantly different from each other (λs = .50 and .43, .61 and .58 respectively), whereas they were significantly better than parents, teachers, and self-reports. Average convergent validity was significantly larger for AS than unsociability (λs = .50 for AS, .45 for exclusion, and .36 for unsociability).

Divergent validity. The three constructs were allowed to correlate with one another to determine if there is a high degree of overlap between the underlying constructs. The correlations among the three constructs was large (r = .89 between AS and peer exclusion, r = .93 between AS and unsociability, and r = .99 between unsociability and exclusion in the three-factor model and .94 between the internal and external solitude in the two-factor model), suggesting poor divergent validity. Fit indices suggest that fit was very similar for the one-, two-, and three-factor models (see Table 3, Figures 3 and 4). Because differences in fit were minimal, correlations among constructs were large, and rules of parsimony suggest the simplest model should be selected, thus it was determined that the one-factor model would be used for subsequent interpretation. In fact, Tables 4 and 5 show that factor loadings and error correlations were extremely similar for the three models.

Shared method variance was examined by allowing the error terms for each informant to correlate. All error correlations in the SEM model were statistically compared as was done with the factor loadings (i.e., using a *t*-test computed by dividing the difference of two error correlations by their pooled standard error). Significant differences in error correlations were apparent by informant (see Table 5). Peers had the lowest shared method variance (Θs = .01 - .20), followed by self (Θs = .33 - .44), teachers (Θs = .27 - .53), and observers (Θs = .19 - .63). Parents had the highest shared method variance (Θs = .51 - .57).

Gender Differences

Gender differences were examined by conducting tests for the equality of covariances matrices for boys and girls through multisample CFAs. Model parameters were similar to those of the combined models (i.e., latent variables were given variances of 1.0, while factor loadings (that were not constrained to zero) were allowed to vary). Results suggest that the covariance matrices were not equal, so models were examined separately for boys and girls (see Tables 6 and 7). Both models had adequate fit, although the model for boys had slightly better fit (see Table 3).

For boys, the model was nearly identical to the combined models by informant with peers having the largest contribution (average λ = .64), followed by observers, parents, and teachers (average λs = .58, .48, .36 respectively), and then self (average λ = .22) (see Table 8). Shared method variance was comparable to the combined models for boys, with peers having lowest error correlations (average Θ = -.05), followed by teachers

and self (*average* Θs = .37 and .38) then parents and observers (both average Θs = .54) (see Table 9). By construct, the model for boys was again similar to the combined models, and average convergent validity was significantly larger for AS than unsociability (λs = .50 for AS, .49 for exclusion, and .39 for unsociability) (see Table 8). Correlations among the three constructs were similar to the combined models and quite large (r = .92 for AS and unsociability, r = .93 for AS and exclusion, and r = .98 for unsociability and exclusion). Factor loadings and error correlations for the two-factor and one-factor models for boys were similar to the three-factor model and are displayed in Tables 8 and 9.

For girls, several differences emerged. Peers again had the largest contribution (average λ = .73). However, unlike the combined models or model with only boys, teachers had the second highest contribution (average λ = .48), followed by parents, self, and observers (average λs = .29, .25, .19 respectively) (see Table 10). Shared method variance was comparable to the combined models, with peers having lowest error correlations (average Θ = .20), followed by self, observers, teachers (average Θs = .41, .42, .48, .59 respectively) and parents (see Table 11). By construct, factor loadings for AS and peer exclusion were significantly larger than for unsociability (average λs = .47 and .44 for AS and exclusion vs. .26 for unsociability) (see Table 10). Correlations among the three constructs were also quite different, with AS and unsociability having larger correlations than in the combined model (r = .98), whereas AS-exclusion and unsociability-exclusion correlations were smaller (rs = .57 and .69 respectively). Factor

loadings and error correlations for the two-factor and one-factor models for girls were similar to the three-factor model and are displayed in Tables 10 and 11.

CHAPTER IV

DISCUSSION

The current study makes several novel contributions to extant literature that are both methodological and conceptual. Interpretation will focus primarily on SEM results because SEM was considered the primary approach of analyses because it allows for examining the unique contribution of each informant on each latent factor while controlling for the perspectives of multiple informants and shared method variance.

Methodological Advances

The current study examines convergence and divergence for multiple constructs assessed through multiple informants through traditional MTMM analyses but also through more advanced SEM analyses.

Multiple constructs. It has commonly been assumed in past research that there are three distinct reasons for solitude: AS, unsociability, and peer exclusion (Asendorpf, 1990; Coplan, et al., 2001; Coplan, et al., 1994; Harrist, et al., 1997; Rubin & Asendorpf, 1993; Rubin & Mills, 1988; Younger, et al., 2000), but past studies had only investigated multiple informant convergence and divergence for AS and peer exclusion, but not unsociability. The current study allowed us to investigate the correlations among AS, unsociability, and peer exclusion, whereas most studies have only examined one of these constructs within a study.

Multiple informants. This study is also novel in that it includes five informants: peers, observers, parents, teachers, and self. Recess observations from trained observers have been included, and to our knowledge, previous investigations have not included observational data in analyses of agreement among informants of solitude to date. The current study also includes self-report data, which has commonly been omitted from past research of convergence and divergence. In addition, assumptions about relationships among self-perception and specific observed solitary behaviors and social partners' perceptions of solitude had not been empirically investigated to our knowledge before the current study. The current study allowed us to examine convergent and divergent validity by informant as well (however, the current study showed poor divergence).

Results from SEM revealed an interesting pattern of informant contribution. For each model, peers contributed more to the latent construct(s) than observers, followed by parents, teachers, and then self reports, which is reminiscent of previous studies which have suggested peers give the highest estimates of deviant behavior and self-ratings yield the lowest (Ledingham et al., 1982). Unexpectedly, teachers did not have high contributions to the latent constructs. This finding may be because teachers are often not attending to the social interactions of children at recess, when solitary behavior is likely to occur. Peers spend a great deal of time with one another and observe each other across different contexts (i.e., class and recess) and have an "inside perspective" on peer interaction. In terms of measurement, peers also had greater reliability for AS, so their increased contributions may be partially due to their better reliability. In addition,

observers had large contributions to each of the constructs, which was expected because children were observed in the same environment that peers were involved in (school recess time). Parents also had unexpectedly large contributions for predicting all three types of solitude. Although they do not directly observe the school environment, they have the longest history with their children. However, their ability to distinguish the three types of solitude was worse than any other informant. Results from traditional MTMM analyses were similar, however teachers had slightly better (and parents had slightly lower) convergence than when using SEM analyses, which supports the premise that agreement is facilitated among informants who share the school environment.

According to SEM analyses, divergent validity was poor for all constructs because of the large correlations among constructs; however, shared method variance was lowest for peers, followed by self and teachers. Whereas convergent validity was less impressive for self and teachers, their shared method variance was slightly better, suggesting that they may be better able to distinguish among the three constructs from one another than parents or observers. These results suggest that peers may be the best combination of predicting the three constructs; however, all of the informants were unable to distinguish the constructs.

Conceptual Contributions

The current study makes several contributions to current research and understanding of the three constructs: AS, unsociability, and peer exclusion. Specifically, the current study provides information on the correlations and separateness

of these three constructs. Because the constructs cannot be separated from one another, they are not discussed separately, so discussion focuses on the correlations and separateness of the three constructs.

As expected, considerable correlations emerged among the three latent constructs: AS, unsociability, and peer exclusion; however these correlations were much larger than expected. Although past research has found support for the three-factor model (Coplan et al., 2004; Gazelle & Ladd, 2003; Gazelle & Rudolph, 2004), the current study cannot statistically distinguish among AS, unsociability, and peer exclusion, suggesting that these constructs may be difficult for social partners to distinguish, may be different manifestations of the same underlying construct, and may be defined by nonspecific definitions that are difficult to measure.

To determine if social partners are making erroneous attributions of solitude or if the convergence between AS and unsociability is real, the correlations of information from social partners with self reports were examined (to determine if social partners are correctly identifying the internal motivation of solitude from observable behaviors). If social partners are misattributing AS to unsociability (or vice versa), it was expected that there would be extremely low correlations between self reports and reports from social partners; however, all correlations between self-reports and reports from social partners for the same construct were significantly different from zero (except for parents), however, these correlations were almost all less than .30, suggesting that although

correlations are not entirely due to social partner error, social partners may indeed have difficulty distinguishing these constructs.

The large correlations among the three constructs may lend evidence to the broader topic of global traits versus momentary states. The large correlations may support the idea that these constructs may not be global traits but momentary states that children can fluctuate between within a small period of time. For example, a child may appear anxious, disinterested in peers, and excluded by peers within a single free play session. In particular, pure orientations of these sources of solitude may be rare, and they may be best described as momentary states rather than global traits. In fact, there are small numbers of children who identified themselves as only unsociable – only three children of the total sample of 688 self-endorsed unsociability and not AS. Likewise, parents and teachers appeared to have difficulty distinguishing among these constructs, which is evident from the large correlations in the different construct – same informant triangles. It appears that not only social partners, but self reports have difficulty distinguishing among the subtle differences of the three constructs. Thus, true unsociability as a global orientation may be difficult to measure because it is rare.

Although three separate constructs were hypothesized, it appears that these three constructs are not distinct from one another, it is nearly impossible to distinguish them, they are poorly measured, or they are poorly defined. It is possible that the same underlying factor (i.e., solitude) may be manifested differently (through anxiety or peer disinterest), but these subtle distinctions are difficult to decipher. For example, children

may feel an inclination towards solitude; however, this inclination may be displayed through anxiety among peers or lack of interest in peers, both of which are met with or a result of peer exclusion. The large correlations among constructs appear to be due to social partner error, but a portion of this correlation may also be due to true overlap among constructs. It was expected that exclusion would accompany both AS and unsociability, so this overlap may account for the large correlation among these constructs. Past research has found that children with AS are likely to experience peer exclusion (Gazelle & Ladd, 2003), so large correlations among constructs may be due to true convergence and not entirely due to erroneous judgments on the part of social partners.

Gender Differences

While the model presenting only data for boys was similar to the combined models, the model presenting data for only girls was quite different. For girls, the correlation of AS and unsociability was quite high and much lower for AS and exclusion and unsociability and exclusion. Past studies have found that boys with AS are more likely to be excluded by their peers than girls (Gazelle & Ladd, 2003), so the large correlations for boys were expected. However, past research has not found this large correlation between AS and unsociability in girls, and it is unclear why it occurred.

The increased contribution of information by teachers for girls may be related to their likelihood to develop closer ties with their teachers (Howes, Phillipsen, & Peisner-Feinberg, 2000). Unexpectedly, observers contributed the least amount of information to

solitude for girls, which suggests that it may be particularly difficult for social partners and observers to distinguish among these sources of solitude in girls; however, the results are again not clear as to why this large correlation between AS-unsociability existed.

Limitations

Measurements in the current study were not ideal. A number of the composites used to identify each of these constructs had poor reliability, which may have explained the poor divergent validity. This poor reliability speaks to the necessity for better measurement for assessing solitude. In addition, items that measured more behavioral and affective characteristics of the constructs may have been more accurately detected by informants whereas items that measured unobservable motivations for solitude may be most accurately measured by self-reports. The items designed to measure AS and peer exclusion are much more observable ("shy with peers," "watches or listens to peers without joining in" and "not chosen as a playmate by peers," "excluded from peer activities" respectively), whereas the items designed to measure unsociability require much more interpretation of motivation by informants ("play alone because they want to," "not interested in peers"). Results suggest that informants had more trouble predicting unsociability and distinguishing unsociability from the other constructs, possibly because more interpretation of internal motivation is necessary when assessing unsociability. Previous studies have operationalized unsociability as an absence of AS, however the current study defines unsociability by the presence of social disinterest (regardless of AS level). The way in which unsociability is defined in past research may

pose a problem for assessing the construct. Items measuring unsociability may be more difficult for social partners because less in known about unsociability. Much more is known about what behaviors accompany AS and peer exclusion, so more research is necessary to determine what behaviors actually accompany disinterest so there is less reliance on social partners to interpret internal motivations. Although behaviors associated with AS and exclusion are more observable, a great deal of interpretation is still necessary to decipher among these constructs. For example, sociometric items used to assess each of these constructs may require subtle distinctions that are very difficult for third graders to make. For example, to identify peers as AS, they were asked to nominate peers who were shy and played alone a lot, and to identify peers as unsociable, they were ask to nominate peers who played alone a lot but were not shy. This distinction may not only be difficult for young children to make, but also for parents and teachers. It appears that the only informants who were able to distinguish between the types of solitude (in particular between AS and unsociability) were observers, who were specifically trained to notice this difference. This finding is apparent in the small correlation between onlooking solitary behavior and unoccupied solitary behavior as rated by observers. These results point to the importance of making clear definitions and distinctions that require minimal interpretation.

Some of the analyses were also based on different sample sizes, which may have skewed results. Specifically, recess observations and parent reports were only available for a portion of the children. In addition, several single-item composites were used for

assessing these constructs. Specifically, teachers completed single-item composites for all constructs, and sociometric and self-report assessments of unsociability were single-item composites. Future studies should focus more strongly on measurement issues and incorporate multiple valid and reliable items answered by multiple informants for multiple constructs to determine convergent and divergent validity.

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Table 1

MTMM Correlation Matrix of Children's Anxious Solitude, Unsociability, and Peer Exclusion

		Peer[a]			Teacher[a]			Self[a]			Observer[b]			Parent[c]		
Informant	Construct	AS	Unsociability	Exclusion	AS	Unsociability	Exclusion	AS	Unsociability	Exclusion	Onlooking	Unoccupied	Exclusion	AS	Unsociability	Exclusion
	M	1.12	1.01	1.26	.80	.46	.45	.48	.12	.34	.25	.27	.22	.38	.26	.22
	SD	1.32	1.16	1.46	1.04	.88	.89	.80	.33	.63	.33	.45	.19	.34	.34	.33
Peer	AS	(.81)														
	Unsociability	.50***	(a)													
	Exclusion	.46***	.31***	(.79)												
Teacher	AS	.39***	.27***	.14***	(a)											
	Unsociability	.26***	.25***	.21***	.62***	(a)										
	Exclusion	.23***	.21***	.42***	.41***	.49***	(a)									
Self	AS	.22***	.21***	.20***	.16***	.16***	.21***	(.57)								
	Unsociability	.09*	.08*	.31***	.08*	.13***	.16***	.41***	(a)							
	Exclusion	.16***	.13***	.27***	.04	.04	.21***	.47***	.36***	(.55)						
Observer	Onlooking	.25***	.14†	.19*	.35***	.21**	.24**	.15†	.04	.19*	(a)					
	Unoccupied	.20**	.15†	.27***	.22**	.18*	.30***	.16*	.25***	.20*	.16*	(a)				
	Exclusion	.28***	.15†	.31***	.31***	.20**	.27***	.14†	.09	.27***	.43***	.60***	(a)			
Parent	AS	.32**	.29**	.31**	.25*	.19†	.17	.28**	-.06	.12	.24*	-.02	.12	(.61)		
	Unsociability	.19†	.09	.19†	.02	-.02	.15	.14	.01	.11	.11	.13	.28**	.36***	(.65)	
	Exclusion	.22*	.12	.38***	.09	.15	.25*	.16	.12	.43***	.06	.10	.20†	.36***	.41***	(.82)

Note. AS = anxious solitude. Parentheses indicate Cronbach's alphas. (a) indicates Cronbach's alpha unable to be computed because measured by a single-item. [a]n = 688. [b]n = 163. [c]n = 92.
Values in triangles with dashed lines are same informant - different construct correlations (shared method variance). Values in diagonals are different informant - same construct correlations (convergent validity).
Values in solid triangles are different informant - different construct correlations (divergent validity).
†p < .10 *p < .05, **p < .01, ***p < .001.

Table 2

Convergent and Divergent Validity of Constructs: Correlations in Validity Diagonal (Convergent Validity, CV), Percentage of Different Construct - Different Informant Correlations Exceeding the Validity Correlation (Divergent Validity), and Percentage of Different Construct - Same Informant Correlations Exceeding the Validity Correlation (Shared Method Variance)

	Anxious Solitude					Unsociability					Exclusion					Total		
	CV	Divergent Validity				CV	Divergent Validity				CV	Divergent Validity				CV	Divergent Validity	
Informant	*r*	Largest DCDI	Percentage CV > DCDI	Largest DCSI	Percentage CV > DCSI	*r*	Largest DCDI	Percentage CV > DCDI	Largest DCSI	Percentage CV > DCSI	*r*	Largest DCDI	Percentage CV > DCDI	Largest DCSI	Percentage CV > DCSI	Average *r*	Average Percentage CV > DCDI	Average Percentage CV > DCSI
Peer-Teacher	0.39	0.27	100%	0.62	0%	0.25	0.27	0%	0.62	0%	0.42	0.23	100%	0.49	25%	0.35	67%	8%
Peer-Self	0.22	0.21	25%	0.50	0%	0.08	0.31	50%	0.50	0%	0.27	0.31	50%	0.47	0%	0.19	42%	0%
Peer-Observer	0.25	0.28	0%	0.50	0%	0.15	0.27	0%	0.60	0%	0.31	0.28	0%	0.60	0%	0.24	0%	0%
Peer-Parent	0.32	0.31	0%	0.50	0%	0.09	0.29	0%	0.50	0%	0.38	0.31	25%	0.46	0%	0.26	8%	0%
Self-Teacher	0.16	0.21	50%	0.62	0%	0.13	0.16	25%	0.62	0%	0.21	0.21	50%	0.49	0%	0.17	42%	0%
Self-Observer	0.15	0.19	0%	0.47	0%	0.25	0.20	50%	0.60	0%	0.27	0.20	25%	0.60	0%	0.22	25%	0%
Self-Parent	0.28	0.16	25%	0.47	0%	0.01	0.12	0%	0.41	0%	0.43	0.12	100%	0.47	0%	0.24	42%	0%
Teacher-Observer	0.35	0.31	25%	0.62	25%	0.18	0.30	0%	0.62	0%	0.27	0.31	0%	0.60	0%	0.27	8%	8%
Teacher-Parent	0.25	0.19	25%	0.62	0%	-0.02	0.19	0%	0.62	0%	0.25	0.17	0%	0.49	0%	0.16	8%	0%
Parent-Observer	0.24	0.12	25%	0.43	0%	0.13	0.28	0%	0.60	0%	0.20	0.28	25%	0.60	0%	0.19	17%	0%
Average/total	0.26		28%		3%	0.13		24%		0%	0.30		38%		3%	0.23	26%	2%

Note . *r* = correlation in validity diagonal; Largest DCDI = largest different construct different informant correlation; Percentage CV > DCDI = percentage of validity diagonal correlations exceeding the different construct different informant correlations. Largest DCSI = highest different construct same informant correlation; Percentage CV > DCSI = percentage of validity diagonal correlations exceeding the different construct same informant correlations.

Table 3

Summary of Model Fit Indices

	χ^2	*df*	*NC*	*RMSEA*	*SRMR*	*GFI*	*CFI*	*ECVI*	*AIC*	*BIC*
Ideal standards	*ns*	*N/A*	*≤3*	*<.06*	*<.08*	*>.95*	*>.95*	*lower*	*lower*	*lower*
Three-factor model	290.69***	72	4.04	0.066	0.02	0.94	0.94	0.56	386.69	604.31
Boys only model	139.03***	72	1.93	0.050	0.02	0.95	0.97	0.71	235.03	417.96
Girls only model	246.56***	72	3.42	0.080	0.04	0.92	0.90	0.97	342.57	528.29
Two-factor model	304.78***	74	4.11	0.067	0.02	0.94	0.93	0.58	396.78	605.34
Boys only model	157.26***	74	2.13	0.058	0.02	0.94	0.96	0.75	249.26	424.58
Girls only model	248.66***	74	3.36	0.082	0.04	0.91	0.90	0.97	340.66	518.65
One-factor model	315.72***	75	4.21	0.068	0.03	0.90	0.93	0.59	405.67	609.69
Boys only model	157.65***	75	2.10	0.058	0.02	0.94	0.96	0.74	247.65	419.16
Girls only model	284.75***	75	3.80	0.089	0.04	0.90	0.88	1.06	374.75	548.87

Note. *df* = degrees of freedom; *NC* = normed chi-square; *RMSEA* = root mean square residual error of approximation; *SRMR* = standardized root mean squared residual; *GFI* = goodness of fit index; *CFI* = comparative fit index. *ECVI* = expected cross-validation index; *AIC* = Akaike information criterion; *BIC* = Bayesian information criterion.
***$p < .001$.

Table 4

Standardized Factor Loadings (λ) and Significance Levels by Construct and Informant for the Models (Convergent Validity)

		Three-factor model	Two-factor model	One-factor model
Construct	Informant	λ	λ	λ
AS				
	Peer	0.82 [a]	0.82 [a]	0.80 [a]
	Observer	0.48 [b]	0.48 [b]	0.51 [b]
	Parent	0.47 [b]	0.47 [b]	0.47 [b]
	Teacher	0.44 [b]	0.43 [b]	0.42 [b]
	Self	0.30 [c]	0.30 [c]	0.29 [c]
Unsociability				
	Peer	0.50 [a]	0.52 [a]	0.50 [a]
	Observer	0.43 [a]	0.40 [a]	0.43 [a]
	Parent	0.38 [b]	0.37 [b]	0.38 [b]
	Teacher	0.34 [b]	0.33 [b]	0.32 [b]
	Self	0.14 [c]	0.13 [c]	0.12 [c]
Exclusion				
	Peer	0.61 [a]	0.60 [a]	0.55 [a]
	Observer	0.58 [a]	0.58 [a]	0.60 [a]
	Parent	0.41 [b]	0.40 [b]	0.39 [b]
	Teacher	0.39 [b]	0.37 [b]	0.34 [b]
	Self	0.28 [c]	0.27 [c]	0.24 [c]

Note. Factor loadings in the same column under each construct heading with different lowercase superscripts are significantly different at $p < .05$ or better.

Table 5

Standardized Error Covariances (Θ) by Informants and Pairs of Constructs for the Models (Shared Method Variance)

		Three-factor model	Two-factor model	One-factor model
Construct	Informant	Θ	Θ	Θ
Anxious Solitude - Unsociability				
	Peer	0.20 [a]	0.19 [a]	0.19 [a]
	Observer	0.22 [a]	0.21 [a]	0.19 [a]
	Parent	0.57 [c]	0.56 [c]	0.55 [c]
	Teacher	0.53 [c]	0.52 [c]	0.52 [c]
	Self	0.40 [b]	0.40 [b]	0.40 [b]
Unsociability - Exclusion				
	Peer	0.01 [a]	0.03 [a]	0.04 [a]
	Observer	0.61 [e]	0.63 [e]	0.61 [e]
	Parent	0.52 [d]	0.53 [d]	0.53 [d]
	Teacher	0.41 [c]	0.42 [c]	0.41 [c]
	Self	0.33 [b]	0.34 [b]	0.34 [b]
Anxious Solitude - Exclusion				
	Peer	0.05 [a]	0.01 [a]	0.03 [a]
	Observer	0.54 [d]	0.53 [d]	0.50 [d]
	Parent	0.53 [d]	0.52 [d]	0.51 [d]
	Teacher	0.29 [b]	0.28 [b]	0.27 [b]
	Self	0.44 [c]	0.44 [c]	0.43 [c]

Note. Error correlations in the same column under each construct heading with different lowercase superscripts are significantly different at $p < .05$ or better.

Table 6

Multitrait-Multimethod Correlation Matrix of Children's Anxious Solitude, Unsociability, and Peer Exclusion for Boys

		Peer[a]			Teacher[a]			Self[a]			Observer[b]			Parent[c]		
Informant	Construct	AS	Unsociability	Exclusion	AS	Unsociability	Exclusion	AS	Unsociability	Exclusion	Onlooking	Unoccupied	Exclusion	AS	Unsociability	Exclusion
	M	.94	.96	1.28	.79	.52	.54	.40	.12	.28	.23	.31	.23	.38	.26	.18
	SD	1.23	1.19	1.57	1.04	.94	.95	.75	.33	.57	.29	.56	.19	.34	.40	.35
Peer	AS	(.79)														
	Unsociability	.58***	(a)													
	Exclusion	.54***	.36***	(.52)												
Teacher	AS	**.32*** **	.24***	.17**	(a)											
	Unsociability	.25***	**.27*** **	.20***	.64***	(a)										
	Exclusion	.31***	.26***	**.37*** **	.51***	.50***	(a)									
Self	AS	**.19*** **	.21***	.15**	**.13** **	.16**	.13*	(.76)								
	Unsociability	.15**	**.11†**	.08	.09†	**.14** **	.14**	.44***	(a)							
	Exclusion	.25***	.21***	**.23*** **	.07	.11*	**.13** **	.46***	.42***	(.67)						
Observer	Onlooking	**.25***	.19	.09	**.28***	.09	.40***	**-.02**	.03	.12	(a)					
	Unoccupied	.27*	**.15**	.37**	.36**	**.29** **	.36**	.23*	**.22***	.31*	.32**	(a)				
	Exclusion	.36**	.28*	**.36** **	.38***	.24*	**.40*** **	.10	.10	**.28***	.54***	.64***	(a)			
Parent	AS	**.52** **	.42**	.39*	**.42** **	.50**	.47**	**.35***	.07	'.23	**.20**	.15	.20	(.55)		
	Unsociability	.36*	**.39***	.49**	.01	**-.04**	.30†	.23	**.03**	.40*	.13	**'.34***	.48**	.40*	(.80)	
	Exclusion	.34*	.27	**.42** **	.26	.35*	**.30†**	.26	.15	**.36***	.12	.11	**.30†**	.57***	.60***	(.85)

Note. AS = anxious solitude. Parentheses indicate Cronbach's alphas. (a) indicates Cronbach's alpha unable to be computed because measured by a single-item. [a]n = 334. [b]n = 67. [c]n = 37.
Different informant - same construct validity coefficients appear in bolded diagonals.
†p < .10 *p < .05, **p < .01, ***p < .001.

Table 7

Multitrait-Multimethod Correlation Matrix of Children's Anxious Solitude, Unsociability, and Peer Exclusion for Girls

		Peer[a]			Teacher[a]			Self[a]			Observer[b]			Parent[c]		
Informant	Construct	AS	Unsociability	Exclusion	AS	Unsociability	Exclusion	AS	Unsociability	Exclusion	Onlooking	Unoccupied	Exclusion	AS	Unsociability	Exclusion
	M	1.29	1.05	1.24	.81	.41	.37	.55	.12	.39	.26	.24	.22	.38	.26	.25
	SD	1.37	1.12	1.36	1.05	.81	.84	.84	.32	.67	.36	.37	.19	.34	.30	.32
Peer	AS	(.72)														
	Unsociability	.43***	(a)													
	Exclusion	.39***	.25***	(.75)												
Teacher	AS	**.45*** **	.31***	.11*	(a)											
	Unsociability	.31***	**.23*** **	.22***	.60***	(a)										
	Exclusion	.19***	.18***	**.47*** **	.30***	.46***	(a)									
Self	AS	**.23*** **	.21***	.24***	**.45*** **	.31***	.19***	(.61)								
	Unsociability	.04	**.05**	.09†	.06	**.11***	.18***	.39***	(a)							
	Exclusion	.07	.06	**.31*** **	.01	.14**	**.31*** **	.47***	.31***	(.64)						
Observer	Onlooking	**.25***	.11	.28**	**.40*** **	.33***	.16	**.26***	.05	.23*	(a)					
	Unoccupied	.15	**.15**	.11***	.07	**.01**	.19†	.09	**.29** **	.10	.26*	(a)				
	Exclusion	.23*	.03	**.26***	.25*	.16	**.16**	.17†	.07	**.09**	.38***	.60***	(a)			
Parent	AS	**.18**	.17	.24†	**.15**	-.05	-.05	**.23†**	-.16	.04	**.26†**	-.11	.08	(.69)		
	Unsociability	.03	**-.25†**	-.10	.02	**.01**	.00	.05	**-.02**	-.12	.09	**-.02**	.14	.33*	(.60)	
	Exclusion	.12	-.02	**.37** **	-.03	-.04	**.21**	.07	.01	**.48*** **	.03	.10	**.15**	.22	.24†	(.81)

Note. AS = anxious solitude. Parentheses indicate Cronbach's alphas. (a) indicates Cronbach's alpha unable to be computed because measured by a single-item.[a]n = 334. [b]n = 67. [c]n = 37. Different informant - same construct validity coefficients appear in bolded diagonals.
†p < .10 *p < .05, **p < .01, ***p < .001.

Table 8

Standardized Factor Loadings (λ) and Significance Levels by Construct and Informant for Boys (Convergent Validity)

		Three-factor model	Two-factor model	One-factor model
Construct	Informant	λ	λ	λ
AS				
	Peer	0.81 [a]	0.80 [a]	0.79 [a]
	Observer	0.55 [b]	0.55 [b]	0.54 [b]
	Parent	0.54 [b]	0.52 [b]	0.51 [b]
	Teacher	0.37 [b]	0.36 [b]	0.36 [b]
	Self	0.22 [c]	0.24 [c]	0.24 [c]
Unsociability				
	Peer	0.50 [a]	0.53 [a]	0.53 [a]
	Observer	0.51 [a]	0.50 [a]	0.50 [a]
	Parent	0.49 [b]	0.46 [b]	0.46 [b]
	Teacher	0.30 [b]	0.30 [b]	0.30 [b]
	Self	0.15 [c]	0.17 [c]	0.17 [c]
Exclusion				
	Peer	0.62 [a]	0.61 [a]	0.61 [a]
	Observer	0.69 [a]	0.68 [a]	0.68 [a]
	Parent	0.42 [b]	0.40 [b]	0.40 [b]
	Teacher	0.40 [b]	0.40 [b]	0.40 [b]
	Self	0.30 [c]	0.30 [c]	0.30 [c]

Note. Factor loadings in the same column under each construct heading with different lowercase superscripts are significantly different at $p < .05$ or better.

Table 9

Standardized Error Correlations (Θ) by Informants and Pairs of Constructs for Boys (Shared Method Variance)

		Three-factor model	Two-factor model	One-factor model
Construct	Informant	Θ	Θ	Θ
Anxious Solitude - Unsociability				
	Peer	-0.07 [a]	-0.10 [a]	0.05 [a]
	Observer	0.40 [b]	0.40 [b]	0.34 [b]
	Parent	0.61 [c]	0.61 [c]	0.59 [c]
	Teacher	0.44 [b]	0.44 [b]	0.45 [b]
	Self	0.39 [b]	0.39 [b]	0.39 [b]
Unsociability - Exclusion				
	Peer	-0.08 [a]	-0.05 [a]	-0.01 [a]
	Observer	0.69 [c]	0.69 [c]	0.66 [c]
	Parent	0.52 [b]	0.52 [b]	0.47 [b]
	Teacher	0.43 [b]	0.44 [b]	0.39 [b]
	Self	0.30 [b]	0.30 [b]	0.30 [b]
Anxious Solitude - Exclusion				
	Peer	-0.01 [a]	-0.07 [a]	-0.07 [a]
	Observer	0.54 [c]	0.54 [c]	0.48 [c]
	Parent	0.51 [c]	0.51 [c]	0.47 [c]
	Teacher	0.24 [b]	0.24 [b]	0.13 [b]
	Self	0.46 [c]	0.46 [c]	0.45 [c]

Note. Error correlations in the same column under each construct heading with different lowercase superscripts are significantly different at $p < .05$ or better.

Table 10

Standardized Factor Loadings (λ) and Significance Levels by Construct and Informant for Girls (Convergent Validity)

		Three-factor model	Two-factor model	One-factor model
Construct	Informant	λ	λ	λ
AS				
	Peer	0.82 [a]	0.83 [a]	0.81 [a]
	Observer	0.30 [c]	0.30 [c]	0.48 [b]
	Parent	0.36 [c]	0.36 [c]	0.42 [b]
	Teacher	0.52 [b]	0.50 [b]	0.49 [b]
	Self	0.34 [c]	0.34 [c]	0.31 [c]
Unsociability				
	Peer	0.54 [a]	0.57 [a]	0.49 [a]
	Observer	0.09 [c]	0.09 [c]	0.35 [b]
	Parent	0.19 [c]	0.20 [c]	0.29 [c]
	Teacher	0.39 [b]	0.39 [b]	0.36 [b]
	Self	0.09 [c]	0.10 [c]	0.08 [d]
Exclusion				
	Peer	0.84 [a]	0.84 [a]	0.52 [a]
	Observer	0.18 [d]	0.19 [d]	0.51 [a]
	Parent	0.32 [c]	0.33 [c]	0.35 [b]
	Teacher	0.53 [b]	0.52 [b]	0.31 [b]
	Self	0.33 [c]	0.33 [c]	0.18 [c]

Note. Factor loadings in the same column under each construct heading with different lowercase superscripts are significantly different at $p < .05$ or better.

Table 11

Standardized Error Correlations (Θ) by Informants and Pairs of Constructs for Girls (Shared Method Variance)

		Three-factor model	Two-factor model	One-factor model
Construct	Informant	Θ	Θ	Θ
Anxious Solitude - Unsociability				
	Peer	0.38 [b]	0.31 [b]	0.31 [b]
	Observer	0.08 [a]	0.05 [a]	0.05 [a]
	Parent	0.54 [c]	0.51 [c]	0.51 [c]
	Teacher	0.60 [c]	0.58 [c]	0.58 [c]
	Self	0.43 [b]	0.43 [b]	0.43 [b]
Unsociability - Exclusion				
	Peer	0.04 [a]	0.05 [a]	0.05 [a]
	Observer	0.56 [c]	0.59 [c]	0.59 [c]
	Parent	0.61 [c]	0.63 [c]	0.63 [c]
	Teacher	0.42 [b]	0.42 [b]	0.42 [b]
	Self	0.39 [b]	0.40 [b]	0.40 [b]
Anxious Solitude - Exclusion				
	Peer	0.18 [a]	0.12 [a]	0.11 [a]
	Observer	0.61 [c]	0.59 [c]	0.58 [c]
	Parent	0.61 [c]	0.60 [c]	0.60 [c]
	Teacher	0.42 [b]	0.41 [b]	0.40 [b]
	Self	0.42 [b]	0.42 [b]	0.42 [b]

Note. Error correlations in the same column under each construct heading with different lowercase superscripts are significantly different at $p < .05$ or better.

Appendix B. Figures

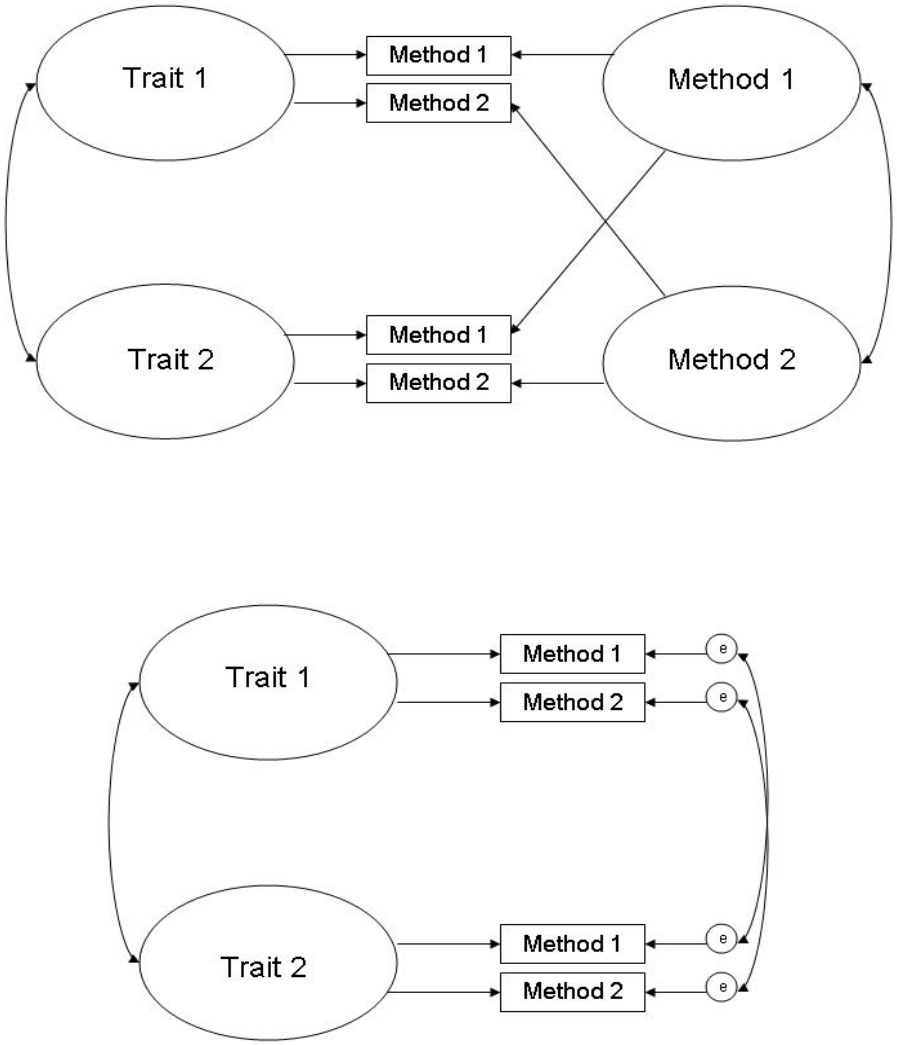

Figure 1. The CTCM (correlated trait – correlated method) model, which has separate factors for traits and methods, is presented at the top. The CTCU (correlated trait – correlated uniqueness) model, which measures shared method variance through error correlations, is presented at the bottom.

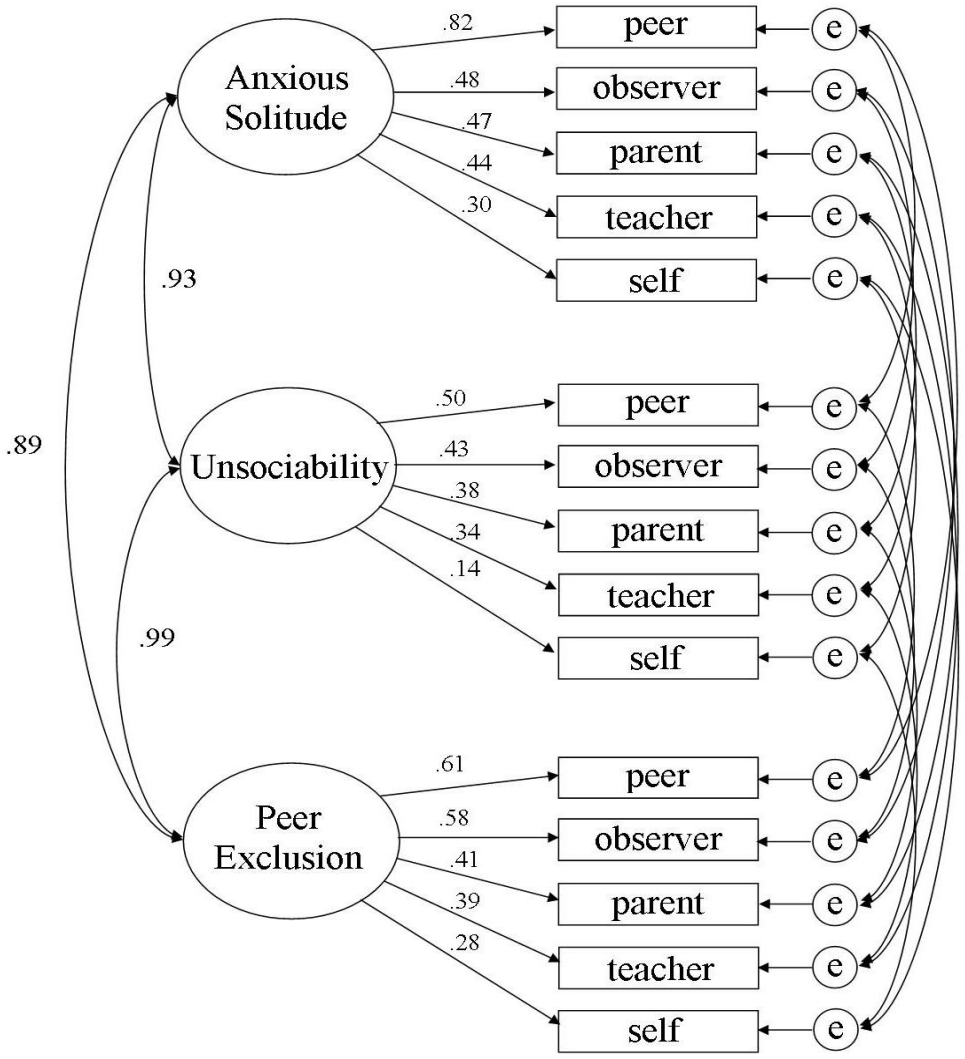

Figure 2. The three-factor model with factor loadings and correlations among constructs. Errors and error correlations not displayed to reduce clutter.

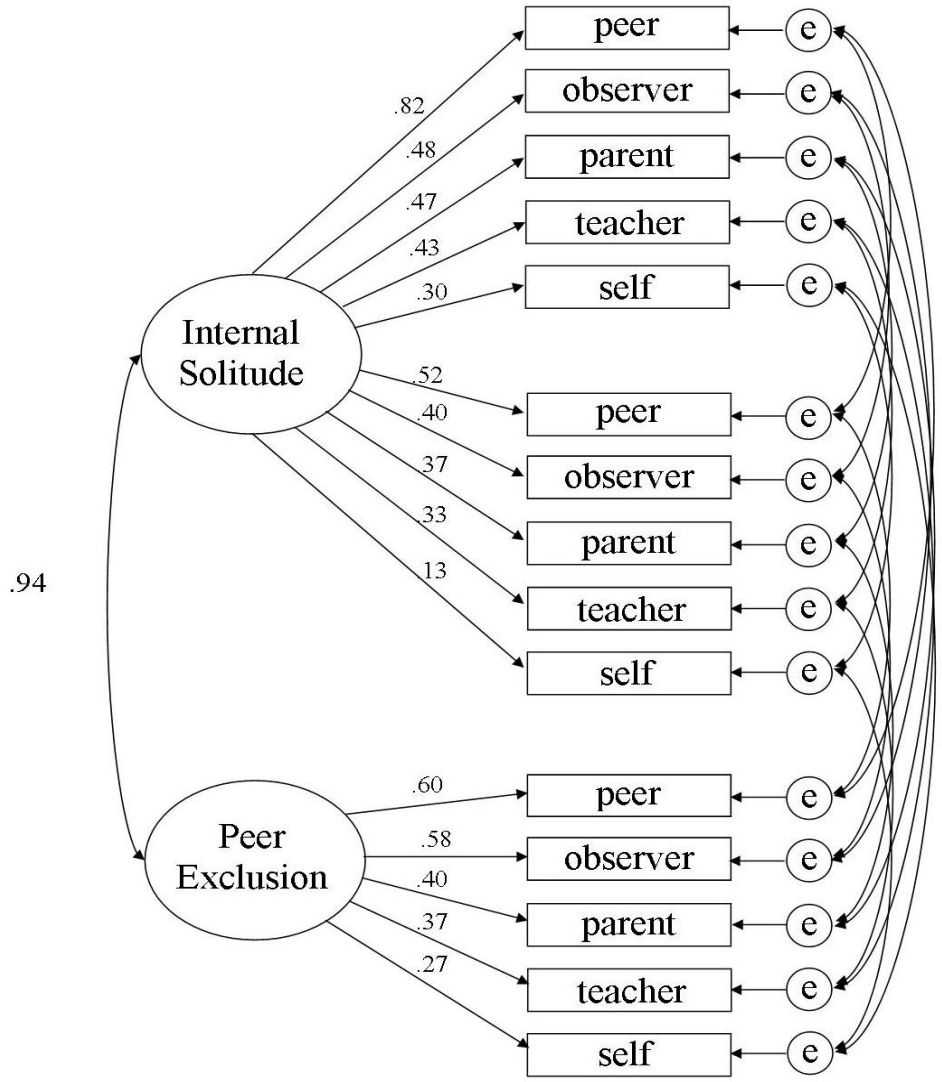

Figure 3. The alternate two-factor model with factor loadings and correlations among constructs. Errors and error correlations not displayed to reduce clutter.

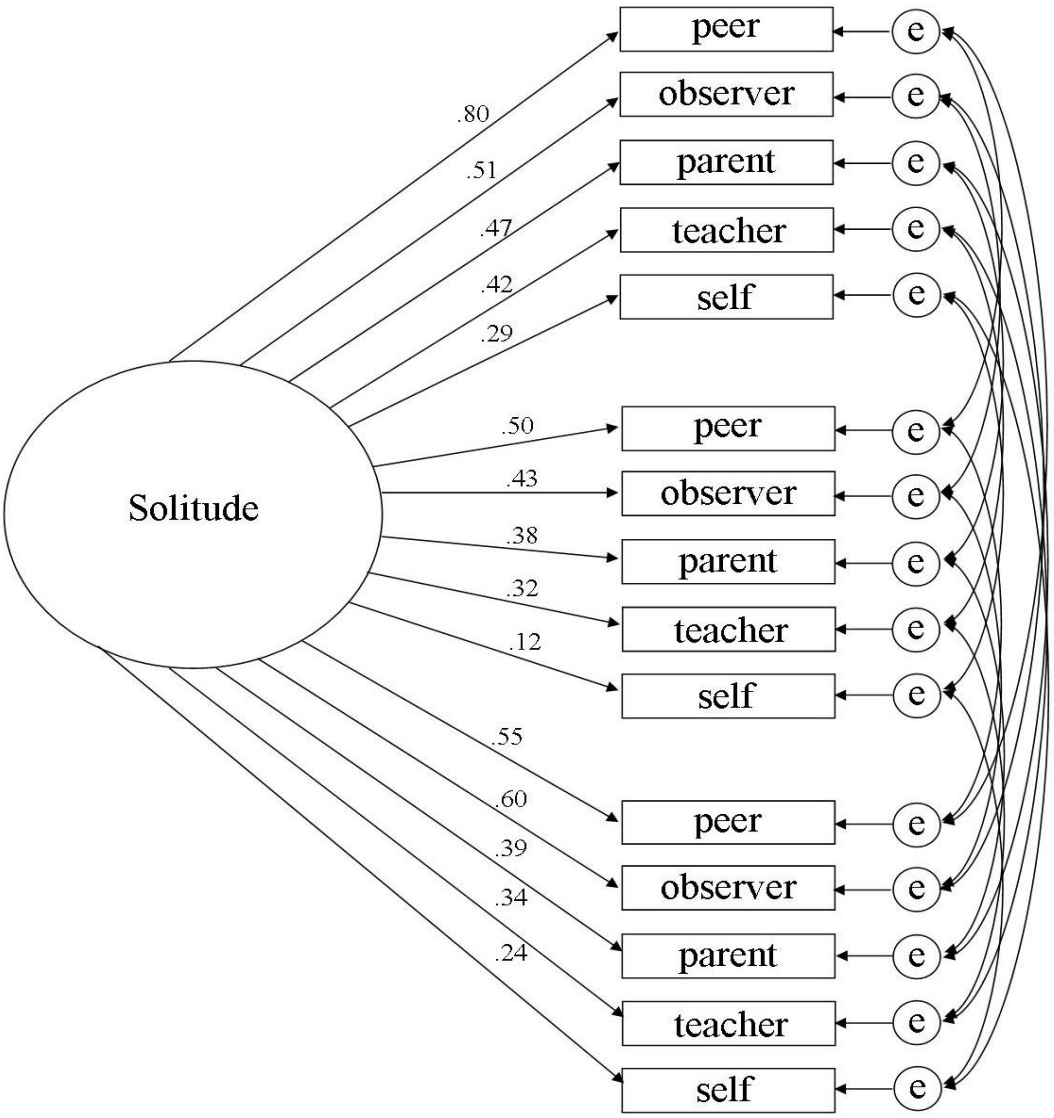

Figure 4. The alternate one-factor model with factor loadings.
Errors and error correlations not displayed to reduce clutter.